IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A crystallization apparatus comprising:

a phase modulation element in which a phase of outgoing light beams relative to incident light beams differs depending on each position;

an illumination system used to generate the incident light beams which enter the phase modulation element;

an image formation optical system provided on an outgoing radiation side of the phase modulation element; and

a stage used to support a substrate having a non-single crystal semiconductor film provided on an outgoing radiation side of the image formation optical system,

wherein the phase modulation element ~~has~~ includes at least two phase modulation units and is configured to transmit a light having a phase distribution based on a phase pattern of the at least two phase modulation ~~unit which is~~ units to vary a light intensity distribution at the non-single crystal semiconductor film, each of the at least two phase modulation units is optically smaller than a radius of a point spread distribution range of the image formation optical system when converted to an image formation surface of the image formation optical system, and the radius of the point spread distribution range of the image formation optical system is defined to satisfy the following equation:

$$R/2 = 0.61 \lambda/NA$$

where R/2 indicates the radius of the point spread distribution range of the image formation optical system, λ indicates a wavelength of the light beams, and NA indicates an image side numerical aperture of the image forming optical system.

Claim 2 (Original): The crystallization apparatus according to claim 1, wherein the phase modulation element has

a phase distribution that area shares of a first area having a first phase value and a second area having

a second phase value vary depending on each position.

Claim 3 (Original): The crystallization apparatus according to claim 2, wherein the phase modulation element has a plurality of cells each of which is optically smaller than the radius of the point spread distribution range of the image formation optical system converted to the image formation surface or the predetermined surface of the image formation optical system, and the area shares of the first area and the second area vary in accordance with each cell.

Claim 4 (Original): The crystallization apparatus according to claim 2, wherein the phase modulation element has a plurality of pixels each of which is optically smaller than the radius of the point spread distribution range of the image formation optical system when converted to the image formation surface or the predetermined surface of the image formation optical system, each pixel has a fixed phase value, and the number of pixels having the same phase value per unit range optically corresponding to the point spread distribution range varies in accordance with each unit range.

Claim 5 (Original): The crystallization apparatus according to claim 2, wherein the phase modulation element has a plurality of stripe-like areas each of which has an optically smaller width than the radius of the point spread distribution range of the image formation optical system when converted to the image formation surface or the predetermined surface

of the image formation optical system, each stripe-like area has a fixed phase value, and a width of each stripe-like area varies along a longitudinal direction.

Claim 6 (Original): The crystallization apparatus according to claim 2, wherein the phase modulation element has a line-and-space pattern whose width is optically smaller than the radius of the point spread distribution range of the image formation optical system when converted to the image formation surface or the predetermined surface of the image formation optical system, each line portion has a first phase value, each space portion has a second phase value, and a ratio in width of the line portion and the space portion which are adjacent to each other varies along a widthwise direction.

Claim 7 (Original): The crystallization apparatus according to claim 1, wherein the phase modulation element has

a cyclic divided area structure, each divided area has a fixed phase value, and the phase modulation element

has a phase distribution that a phase value varies in accordance with each divided area.

Claim 8 (Original): The crystallization apparatus according to claim 7, wherein the phase modulation element has a plurality of pixels each of which is optically smaller than the radius of the point spread distribution range of the image formation optical system when converted to the image formation surface or the predetermined surface of the image formation optical system, each pixel has a fixed phase value, and the phase value varies in accordance with each pixel.

Claim 9 (Original): The crystallization apparatus according to claim 7, wherein the phase modulation element has a line-and-space pattern whose width is optically smaller than the radius of the point spread distribution range of the image formation optical system when converted to the image formation surface or the predetermined surface of the image formation optical system, and the phase value varies in accordance with each line portion.

Claim 10 (Original): The crystallization apparatus according to claim 1, wherein the phase modulation element has a first stripe-like area which has a first phase distribution and extends in a direction along which a phase varies and a second stripe-like area which has a second phase distribution and extends in the direction along which the phase varies, the first stripe-like area and the second stripe-like area are adjacent to each other with a border line parallel with the direction along which the phase varies therebetween, and an average phase value on the first stripe-like area side is substantially different from an average phase value on the second stripe-like area side in a local area on the border line.

Claim 11 (Original): The crystallization apparatus according to claim 10, wherein the first stripe-like area and the second stripe-like area are configured to have substantially the same light intensity distributions which are formed in accordance therewith, the average phase value on the first stripe-like area side is substantially different from the average phase value on the second stripe-like area side in a first local area on the border line corresponding to a part where a light intensity in the light intensity distribution is small, and the average phase value on the first stripe-like area side is substantially equal to the average phase value on the second stripe-like area side in a second local area on the border line corresponding to a part where a light intensity in the light intensity distribution is large.

Claim 12 (Original): The crystallization apparatus according to claim 11, wherein the first stripe-like area and the second stripe-like area have a line-and-space pattern whose width is optically smaller than the radius of the point spread distribution range of the image formation optical system when converted to the image formation surface or the predetermined surface of the image formation optical system, each line portion has the first phase value, each space portion has the second phase value, and a ratio in width of the line portion and the space portion which are adjacent to each other varies in a widthwise direction.

Claim 13 (Original): The crystallization apparatus according to claim 11, wherein the first stripe-like area and the second stripe-like area have a line-and-space pattern whose with is optically smaller than the radius of the point spread distribution range of the image formation optical system when converted to the image formation surface or the predetermined surface of the image formation optical system, and a phase value varies in accordance with each line portion.

Claim 14 (Original): The crystallization apparatus according to claim 1, wherein the phase modulation element comprises isolated areas each of which is optically smaller than the radius of the point spread distribution range of the image formation optical system when converted to the image formation surface or the predetermined surface of the image formation optical system and has a phase value which is substantially different form that of the periphery in accordance with parts where a light intensity of a light intensity distribution to be formed is small.

Claim 15 (Original): The crystallization apparatus according to claim 1, wherein the phase modulation element turns the incident light beams to a light intensity distribution with

a concave pattern that a light intensity is increased toward the periphery from a central area having a first light intensity.

Claim 16 (Original): The crystallization apparatus according to claim 15, wherein the light intensity distribution with the concave pattern has a distribution that the light intensity is one-dimensionally increased from the central area toward the periphery.

Claim 17 (Original): The crystallization apparatus according to claim 15, wherein the predetermined light intensity distribution has a light intensity distribution with an inverse peak pattern that the light intensity is suddenly increased toward the periphery from a second central area having a second light intensity substantially smaller than the first light intensity in the vicinity of the central area of the light intensity distribution with the concave pattern.

Claim 18 (Original): The crystallization apparatus according to claim 16, wherein the predetermined light intensity distribution has a light intensity distribution with an inverse peak pattern that the light intensity is suddenly increased toward the periphery from a second central area having a second light intensity substantially smaller than the first light intensity in the vicinity of the central area of the light intensity distribution with the concave pattern.

Claim 19 (Currently Amended): An exposure apparatus comprising:

a phase modulation element in which a phase of outgoing light beams relative to incident light beams differs depending on each position; an illumination system used to generate the incident light beams which enter the phase modulation element; an image formation optical system provided on an outgoing radiation side of the phase modulation

element; and an image formation optical system arranged in a light path between the phase modulation element and a predetermined surface,

wherein the phase modulation element ~~has~~ includes at least two phase modulation units and is configured to transmit a light having a phase distribution based on a phase pattern of the at least two phase modulation ~~unit which is~~ units to vary a light intensity distribution at the non-single crystal semiconductor film, each of the at least two phase modulation units is optically smaller than a radius of a point spread distribution range of the image formation optical system when converted to an image formation surface of the image formation optical system, and the radius of the point spread distribution range of the image formation optical system is defined to satisfy the following equation:

$R/2 = 0.61 \lambda/NA$

where R/2 indicates the radius of the point spread distribution range of the image formation optical system, λ indicates a wavelength of the light beams, and NA indicates an image side numerical aperture of the image forming optical system.

Claim 20 (Withdrawn): A crystallization method comprising:

illuminating a phase modulation element having a phase distribution based on a phase modulation unit which is optically smaller than a radius of a point spread distribution range of an image formation optical system when converted to an image formation surface; and

irradiating a polycrystal semiconductor film or an amorphous semiconductor film with light beams having a predetermined light intensity distribution through the image formation optical system arranged in a light path between the phase modulation element and the polycrystal semiconductor film or the amorphous semiconductor film, thereby generating a crystallized semiconductor film.

Claim 21 (Withdrawn): A crystallization method comprising:

illuminating a phase modulation element having a phase distribution based on a phase modulation unit which is optically smaller than a radius of a point spread distribution range of an image formation optical system when converted to an image formation surface; and

forming a predetermined light intensity distribution on a predetermined surface through the image formation optical system arranged in a light path between the phase modulation element and the predetermined surface.

Claim 22 (Withdrawn): A phase modulation element having a phase distribution based on a phase modulation unit having a predetermined size, comprising:

a first area having a first phase value; and

a second area having a second phase value,

wherein the phase distribution is defined by a change in area shares of the first area and the second area depending on each position.

Claim 23 (Withdrawn): The phase modulation element according to claim 22, wherein the phase modulation element has a plurality of cells, and area shares of the first area and the second area in each cell vary in accordance with each cell.

Claim 24 (Withdrawn): The phase modulation element according to claim 22, wherein the phase modulation element comprises a plurality of pixels each having a fixed phase value, and the number of pixels having the same phase value per unit range varies in accordance with each unit range.

Claim 25 (Withdrawn): The phase modulation element according to claim 22, wherein the phase modulation element comprises a plurality of stripe-like areas each having a fixed phase value, and a width of each stripe-like area varies along a longitudinal direction.

Claim 26 (Withdrawn): The phase modulation element according to claim 22, wherein the phase modulation element has a line-and-space pattern which includes a plurality of line portions each having the first phase value and a plurality of space portions each having the second phase value, and a ratio in width of the line portion and the space portion which are adjacent to each other varies along a widthwise direction.

Claim 27 (Withdrawn): A phase modulation element having a phase distribution based on a phase modulation unit having a predetermined size, comprising:

a plurality of divided areas each having a fixed phase value,

wherein each of the divided areas has a phase distribution that the phase value cyclically varies in accordance with each divided area.

Claim 28 (Withdrawn): The phase modulation element according to claim 27, wherein the phase modulation element comprises a plurality of pixels each having a fixed phase value, and the phase value of each pixel varies in accordance with each pixel.

Claim 29 (Withdrawn): The phase modulation element according to claim 27, wherein the phase modulation element has a line-and-space pattern, and a the phase value varies in accordance with each line portion.

Claim 30 (Withdrawn): A phase modulation element having a phase distribution based on a phase modulation unit having a predetermined size, comprising:

a first stripe-like area which has a first phase distribution and extends in a direction along which a phase varies; and

a second stripe-like area which has a second phase distribution and extends in the direction along which the phase varies,

wherein the first stripe-like area and the second stripe-like area are adjacent to each other with a border line parallel with the direction along which the phase varies therebetween, and an average phase value on the first stripe-like area side is substantially different from an average phase value on the second stripe-like area side in a local area on the border line.

Claim 31 (Withdrawn): The phase modulation element according to claim 30, wherein the first stripe-like area and the second stripe-like area are configured to have substantially the same light intensity distributions which are formed in accordance therewith, the average phase value on the first stripe-like area side is substantially different from the average phase value on the second stripe-like area side in a first local area on the border line corresponding to a part where a light intensity in the light intensity distribution is small, and the average phase value on the first stripe-like area side is substantially equal to the average phase value on the second stripe-like area side in a second local area on the border line corresponding to a part where a light intensity in the light intensity distribution is large.

Claim 32 (Withdrawn): The phase modulation element according to claim 30, wherein the first stripe-like area and the second stripe-like area have a line-and-space pattern, each line portion has a first phase value, each space portion has a second phase value, and a

ratio in width of the line portion and the space portion which are adjacent to each other varies along a widthwise direction.

Claim 33 (Withdrawn): The phase modulation element according to claim 31, wherein the first stripe-like area and the second stripe-like area have a line-and-space pattern, each line portion has a first phase value, each space portion has a second phase value, and a ratio in width of the line portion and the space portion which are adjacent to each other varies along a widthwise direction.

Claim 34 (Withdrawn): The phase modulation element according to claim 30, wherein the first stripe-like area and the second stripe-like area have a line-and-space pattern, and the phase value of the line portion varies in accordance with each line.

Claim 35 (Withdrawn): The phase modulation element according to claim 31, wherein the first stripe-like area and the second stripe-like area have a line-and-space pattern, and the phase value of the line portion varies in accordance with each line.

Claim 36 (Withdrawn): The phase modulation element according to claim 22, wherein the phase modulation element comprises isolated areas each of which has a phase value which is substantially different from that of a periphery in accordance with parts where a light intensity in a light intensity distribution to be formed is small.

Claim 37 (Withdrawn): A device comprising:

a semiconductor film manufactured by

a crystallization method, the crystallization method comprising: illuminating a phase modulation element having a phase distribution based on a phase modulation unit which is optically smaller than a radius of a point spread distribution range of an image formation optical system when converted to an image formation surface; and forming a predetermined light intensity distribution on a predetermined surface through the image formation optical system arranged in a light path between the phase modulation element and the predetermined surface.

Claim 38 (Withdrawn): A display apparatus comprising:

a pair of substrates joined to each other with a predetermined gap therebetween;

an electro-optic material held in the gap;

an opposed electrode formed on one of the substrates; and

a semiconductor thin film which can provide pixel electrodes formed on the other substrate and thin film transistors which drive the pixel electrodes,

wherein the semiconductor thin film is

a semiconductor film crystallized by irradiating the polycrystal semiconductor film or the amorphous semiconductor film with light beams having a predetermined light intensity distribution through a phase modulation element in which a phase of outgoing light beams relative to incident light beams varies depending on each position and an image formation optical system.

Claim 39 (New): A crystallization apparatus comprising:

a phase modulation element in which a phase of outgoing light beams relative to incident light beams differs depending on each position;

an illumination system used to generate the incident light beams which enter the phase modulation element;

an image formation optical system provided on an outgoing radiation side of the phase modulation element; and

a stage used to support a substrate having a non-single crystal semiconductor film provided on an outgoing radiation side of the image formation optical system,

wherein the phase modulation element includes at least two phase modulation units and is configured to transmit a light having a phase distribution based on a phase pattern of the at least two phase modulation units to vary a light intensity distribution at the non-single crystal semiconductor film, each of the at least two phase modulation units is optically smaller than a radius of a point spread distribution range of the image formation optical system in at least one direction when converted to an image formation surface of the image formation optical system, and the radius of the point spread distribution range of the image formation optical system is defined to satisfy the following equation:

$$R/2 = 0.61 \lambda/NA$$

where R/2 indicates the radius of the point spread distribution range of the image formation optical system, λ indicates a wavelength of the light beams, and NA indicates an image side numerical aperture of the image forming optical system.